front surface of the front element, **5** is the back surface of the front element, **6** is the front surface of the back element, and **7** is the back surface of the back element. In this optical configuration, surface **4** is an aspheric+diffractive surface, surface **5** is a spherical surface, surface **6** is a planar surface, and surface **7** is an aspheric surface.

Referring to FIG. **4**, the back aberration correction lens has an aspheric surface and a planar surface. Here, **1** is the front element, **2** is the back element, **3** is the FPA, **4** is the front surface of the front element, **5** is the back surface of the front element, **6** is the front surface of the back element, and **7** is the back surface of the back element. In this optical configuration, surface **4** is an aspheric+diffractive surface, surface **5** is a spherical surface, surface **6** is an aspheric surface, and surface **7** is a planar surface.

Referring to FIG. **5**, the front aberration correction lens has an aspheric surface and a planar surface. Here, **1** is the front element, **2** is the back element, **3** is the FPA, **4** is the front surface of the front element, **5** is the back surface of the front element, **6** is the front surface of the back element, and **7** is the back surface of the back element. In this optical configuration, surface **4** is an aspheric surface, surface **5** is a planar surface, surface **6** is an aspheric+diffractive surface, and surface **7** is a spherical surface.

Referring to FIG. **6**, the front aberration correction lens has an aspheric surface and a planar surface. Here, **1** is the front element, **2** is the back element, **3** is the FPA, **4** is the front surface of the front element, **5** is the back surface of the front element, **6** is the front surface of the back element, and **7** is the back surface of the back element. In this optical configuration, surface **4** is a planar surface, surface **5** is an aspheric surface, surface **6** is an aspheric+diffractive surface, and surface **7** is a spherical surface.

Referring to FIG. **7**, the back aberration correction lens has an aspheric surface and a planar surface. Here, **1** is the front element, **2** is the back element, **3** is the FPA, **4** is the front surface of the front element, **5** is the back surface of the front element, **6** is the front surface of the back element, and **7** is the back surface of the back element. In this optical configuration, surface **4** is a spherical surface, surface **5** is an aspherical+diffractive surface, surface **6** is a planar surface, and surface **7** is an aspheric surface.

Referring to FIG. **8**, the back aberration correction lens has an aspheric surface and a planar surface. Here, **1** is the front element, **2** is the back element, **3** is the FPA, **4** is the front surface of the front element, **5** is the back surface of the front element, **6** is the front surface of the back element, and **7** is the back surface of the back element. In this optical configuration, surface **4** a spherical surface, surface **5** is an aspheric+diffractive surface, surface **6** is an aspheric surface, and surface **7** is a planar surface.

Example 1

A lens sample was shown here. This lens is an optically a-thermalized lens for the wavelength range from 8-12 micron. The focal length, F #, and the angular FOV (Field of View) of it are 22.5 mm, 1.4, and 22.6°, respectively.

1. The first optical element is an aberration correction lens with the following features/specifications/parameters.
   a. The material of it is Germanium.
   b. The first surface is an aspheric surface with maximum sag of 23 micron.
   c. The second surface is a planar surface.
2. The second optical element is a molded lens with the following features/specifications/parameters.
   a. The material of it is one kind of chalcogenide glass, $As_{40}Se_{60}$.
   b. The first surface is a concave spherical surface.
   c. The second surface is a convex aspheric+diffractive surface.

Both the molded lens and the aberration correction are cost-effective. The total cost including the material and the manufacturing is significantly lower than the conventional lenses of the same optical performance and specifications for volume production.

What is claimed is:

1. A lens system comprising:

a first lens element having a first and second surface, one of the first and second surfaces being a concave surface and the other of the first and second surfaces being a convex surface, and one of the first and second surfaces of the first lens element being a diffractive surface, the first lens element comprising chalcogenide glass, and

a second lens element having a planar surface and no diffractive surfaces, the second lens element comprising a material selected from the group consisting of Germanium, Silicon, ZnSe, ZnS, CdTe, KBr, CaF2, BaF2, MgF2, SiO2, and GaAs,

wherein the optical power of the first lens element is greater than the optical power of the second lens element, and

wherein the second lens element provides aberration correction.

2. The lens system of claim **1**, wherein the focal length of the lens system is about 22.5 mm.

3. The lens system of claim **1**, wherein the second lens element comprises an aspheric surface opposite the planar surface.

4. The lens system of claim **1**, wherein the first lens element comprises an aspheric surface.

5. The lens system of claim **1**, wherein the first lens element comprises a spherical surface.

6. An imaging system comprising the lens system of claim **1**, the imaging system comprising a focal plane array (FPA), wherein the second lens element is between the first lens element and FPA, the lens system configured to direct light incident on the first lens element in a wavelength range between 1 to 14 micron on the FPA.

7. The lens system of claim **6**, wherein the lens system has no other lens elements positioned between the first lens element and the second lens element.

8. The lens system of claim **7**, wherein there are no other lens elements positioned between the second lens element and the FPA.

9. An imaging system comprising the lens system of claim **1**, the imaging system comprising a focal plane array (FPA), wherein the first lens element is between the second lens element and FPA, the lens system configured to direct light incident on the second lens element in a wavelength range between 1 to 14 micron on the FPA.

10. The lens system of claim **9**, wherein there are no other lens elements positioned between the second lens element and the FPA.

11. The lens system of claim **10**, wherein there are no other lens elements positioned between the first lens element and the second lens element.

12. A lens assembly comprising:

a first lens element comprising chalcogenide glass, the first lens element having a first and second surface, one of the first and second surfaces being a concave surface and the other of the first and second surfaces being a